

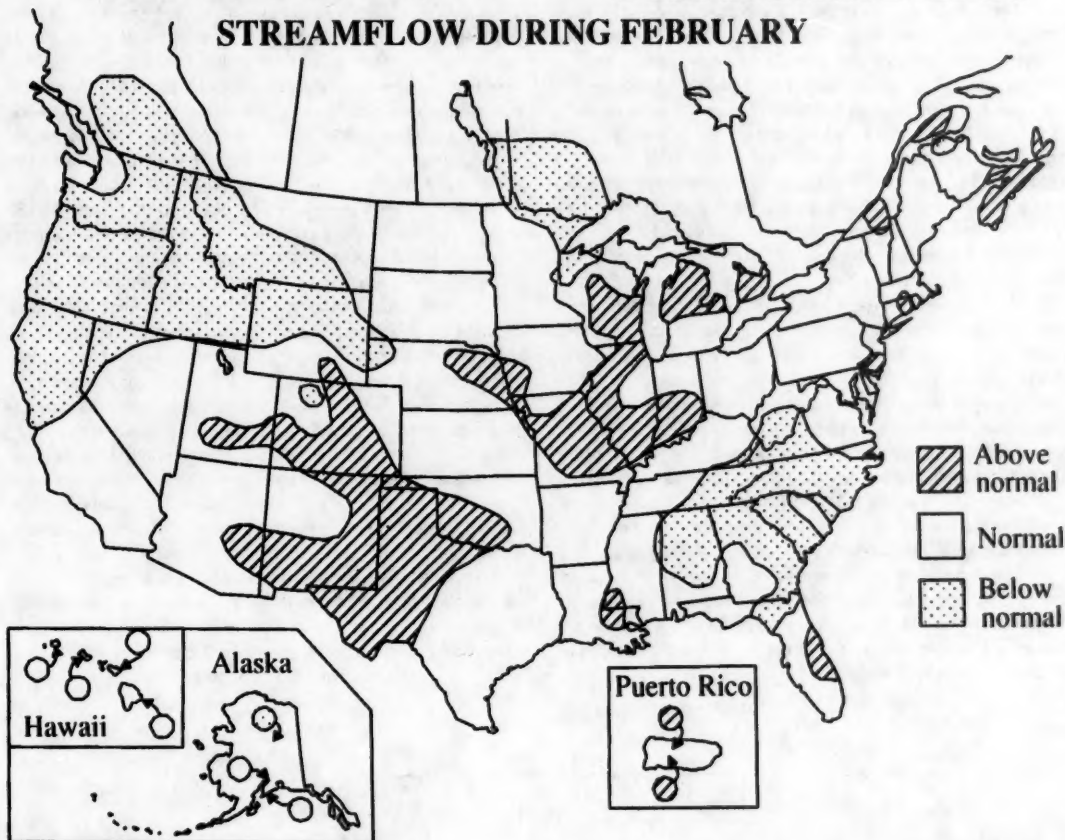
National Water Conditions

UNITED STATES
Department of the Interior
Geological Survey

CANADA
Department of the Environment
Water Resources Branch

FEBRUARY 1988

STREAMFLOW DURING FEBRUARY



Low streamflow persisted in the Pacific Northwest for the 11th consecutive month as most of the West had an unusually dry February. Monthly mean flows were in the below-normal range at 15 of the 17 index streamflow stations in Montana, Idaho, Washington, and Oregon.

Streamflow was in the normal to above-normal range at 75 percent of the 190 reporting index stations in southern Canada, the United States, and Puerto Rico, about the same as the 74 percent of 191 reporting stations in those ranges for last month. Below-normal streamflow persisted in a large area from southern British Columbia to northwestern Nebraska, and flows moved into the below-normal range to the southwest of that area. Above-normal streamflow persisted in one large area centered on western Texas, and also in several smaller areas, the two largest centered on western Iowa and Lake Michigan. Only one February low and one February high occurred at streamflow index stations.

Mean February elevations at the four master gages on the Great Lakes (provisional National Ocean Service data) were in the normal range except on Lake Erie, which rose into the above-normal range.

The level of Utah's Great Salt Lake was 4,209.55 feet above National Geodetic Vertical Datum of 1929 on February 29.

The combined flow of the 3 largest rivers in the lower 48 States—Mississippi, St. Lawrence, and Columbia—was in the normal range during February, after decrease by 4 percent from January to February.

Contents of 74 percent of reporting reservoirs were near or above average for the end of February, about the same as for the end of January (75 percent).

SURFACE-WATER CONDITIONS DURING FEBRUARY 1988

Low streamflow persisted in the Pacific Northwest for the 11th consecutive month as most of the West had an unusually dry February—less than 40 percent of average precipitation fell during the month over much of the West. Total precipitation in the Pacific Northwest States of Oregon, Washington, Idaho, and Montana for December 1987 through February 1988 ranged from 1.26 inches above average (Yakima, Washington) to 14.59 inches below average (Quillayute, Washington). Monthly mean flows were in the below-normal range at 15 of the 17 index streamflow stations in Montana, Idaho, Washington, and Oregon. Total February mean flow at the 17 index stations in the States of Oregon, Washington, Idaho, and Montana was 129,930 cubic feet per second (cfs), 44 percent below the total median, and has been at least 18 percent below the total median for every month from January 1986 through February 1988 (with the exception of March 1987, when flow was 5 percent above median). Bar graphs comparing total mean with total median from September 1985 through December 1988 for the index stations in those four states are on page 3. These graphs show that streamflow for May and June 1987, usually the months of highest streamflow, was well below normal, reflecting the below-average precipitation of the preceding winter.

The only other area in which similar dry conditions have occurred during the same period is in the Southeast (those States in the area from the Mississippi River to the Atlantic Ocean and south of the Ohio River-Pennsylvania State Line). The same type of bar graphs are used to show conditions at 39 index stations (excluding those on the Mississippi River and Ohio River) in the Southeast for the same period. In contrast to the Pacific Northwest, streamflow in the Southeast was higher in the 1987 water year than in the 1986 water year. However, total monthly mean flows for the 1988 water year are lower than those of the 1987 water year for each month except January 1988.

Flows generally decreased from January to February in about a third of the Provinces and States: seasonally in Alaska, Oregon, Quebec, Florida, and Puerto Rico; variably in Hawaii, California, Montana, Texas, and Alabama; and contraseasonally in Utah, Kansas, Oklahoma, Arkansas, Tennessee, the

Carolinas, Virginia, and West Virginia. Flows changed seasonally in Wyoming and Ontario, and variably in Colorado, North Dakota, Minnesota, Georgia, Maryland, and New Brunswick. Streamflow generally increased in the rest of southern Canada and the United States: variably in Washington, Wisconsin, Michigan, and Maine; contraseasonally in British Columbia, Alberta, Saskatchewan, South Dakota, New York, Massachusetts, New Hampshire, Vermont, and Nova Scotia; and seasonally in all other areas.

Streamflow was in the normal to above-normal range at 75 percent of the 190 reporting index stations in southern Canada, the United States, and Puerto Rico, about the same as the 74 percent of 191 reporting stations in those ranges for last month. This is the second lowest percentage of stations with flow in the normal to above-normal range for February in the last 6 years. About 72 percent of 191 stations were in the normal to above-normal range in February 1987 and, at the opposite extreme, about 95 percent of 191 stations were in those ranges in February 1983. Total February flow of 2,122,400 cfs for the 180 index stations in the conterminous United States and southern Canada was 4.8 percent above median, and the second lowest for February in the last 6 years: only February 1987 was lower.

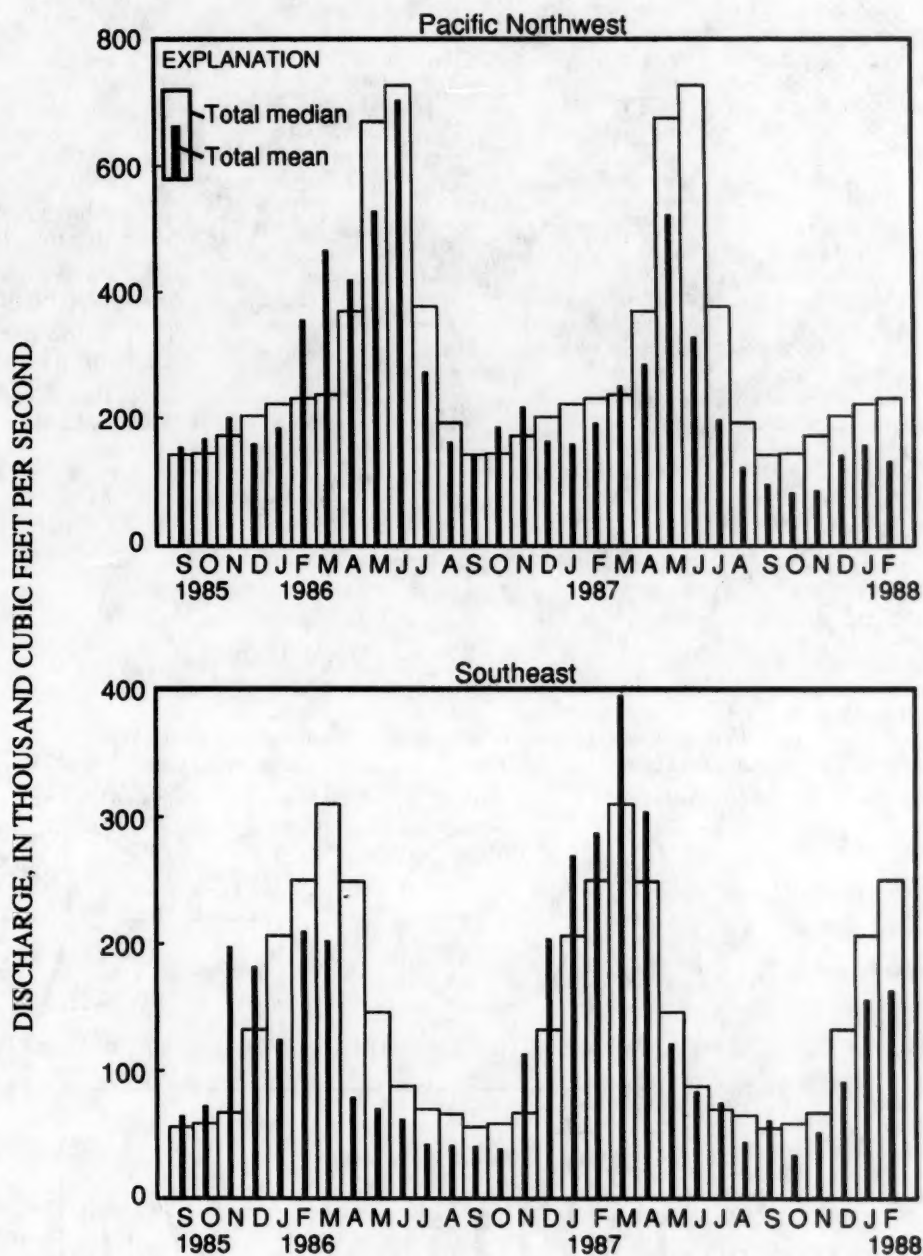
Below-normal streamflow persisted in a large area from southern British Columbia to northwestern Nebraska, and moved into the below-normal range to the southwest of that area. Below-normal flows also persisted in parts of Colorado; a contiguous area including parts of Manitoba, Ontario, Minnesota, Wisconsin, with flows moving into the below-normal range north of that area; Long Island, New York; and also in parts of several Southeastern States, with flows moving into the below-normal range in much of the rest of the Southeast. Above-normal streamflow persisted in one large area centered on western Texas, and also in several smaller areas, the two largest centered on western Iowa and Lake Michigan. Flows increased into the above-normal range in several areas, the three largest being parts of New Mexico and Arizona; an area from northern Missouri to southern Indiana; and Nova Scotia.

(Continued on page 7.)

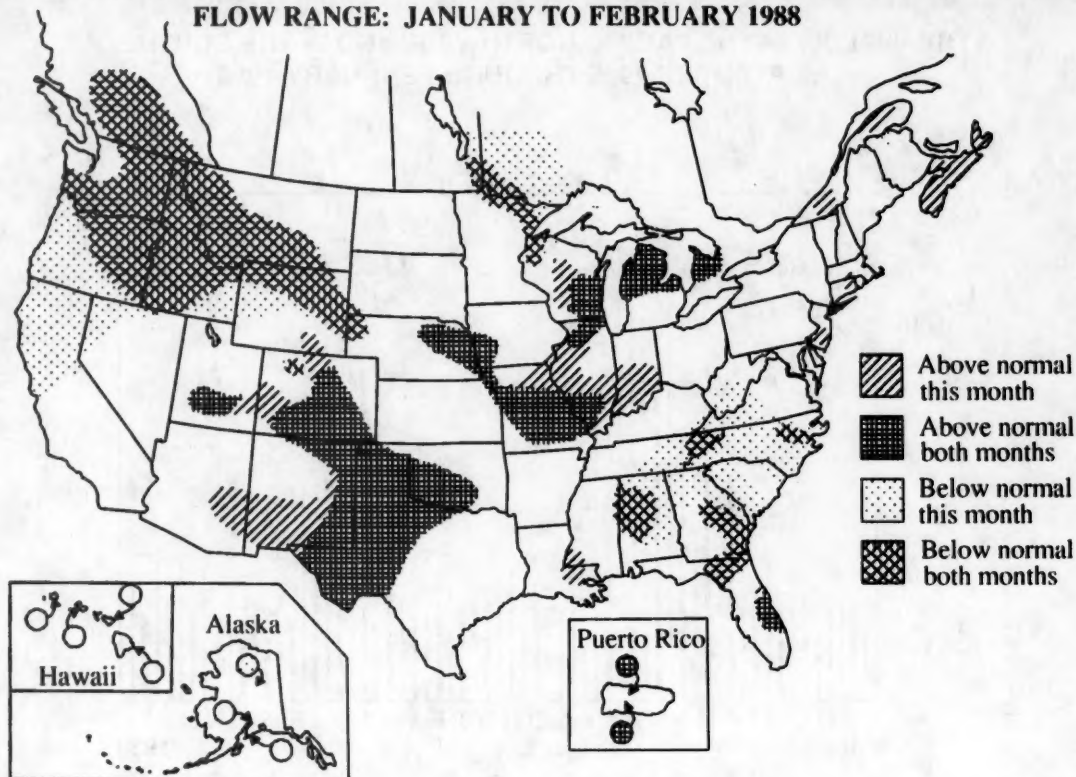
CONTENTS

	Page
Streamflow (map)	1
Surface-water conditions	2
Streamflow in the Pacific Northwest and in the Southeast, September 1985 through February 1988	3
Monthly mean discharge of selected streams (graphs)	5
Great Lakes elevations (graphs)	6
Fluctuations of the Great Salt Lake, February 1981-February 1988 (graph)	6
Hydrographs for the "Big 3" rivers - combined and individual flows (graphs)	8
Dissolved solids and water temperatures at downstream sites on five large rivers	8
Flow of large rivers	9
Usable contents of selected reservoirs (graphs)	10
Usable contents of selected reservoirs	11
Ground-water conditions	12
Total Precipitation and Percentage of Normal Precipitation (maps)	14
Temperature and precipitation outlooks for March through May 1988 (maps)	15
Explanation of data	15

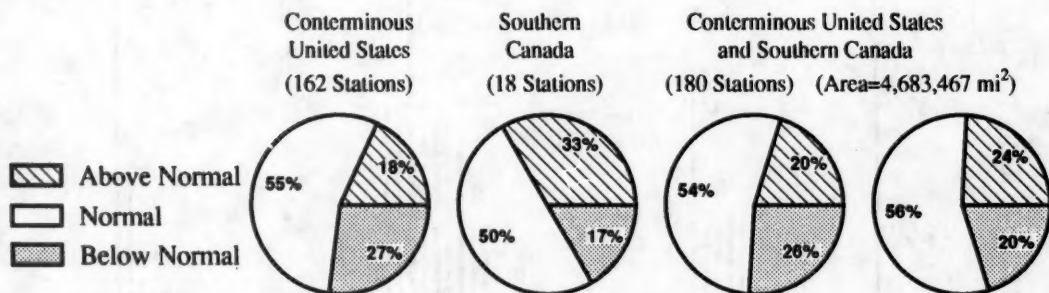
STREAMFLOW IN THE PACIFIC NORTHWEST AND IN THE SOUTHEAST, SEPTEMBER 1985 THROUGH FEBRUARY 1988



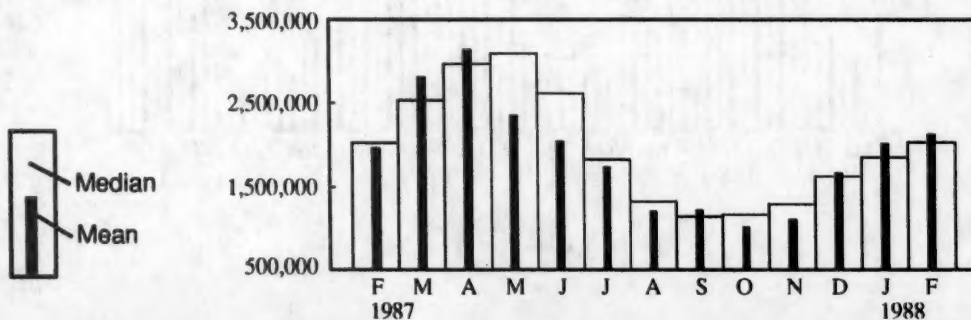
**PERSISTENCE IN, OR MOVEMENT INTO, THE BELOW-NORMAL OR ABOVE-NORMAL
FLOW RANGE: JANUARY TO FEBRUARY 1988**



**SUMMARY OF FEBRUARY 1988 STREAMFLOW
FLOW RANGES**



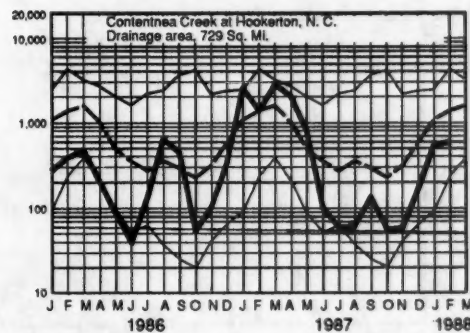
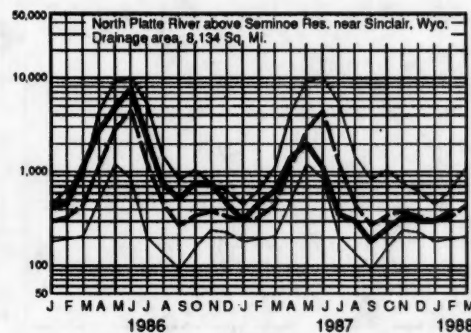
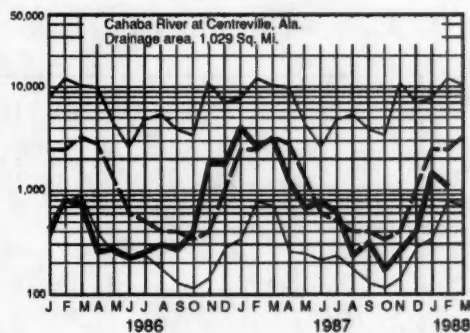
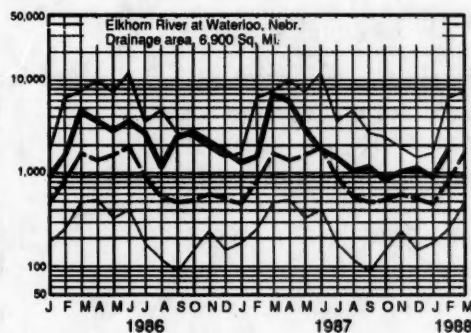
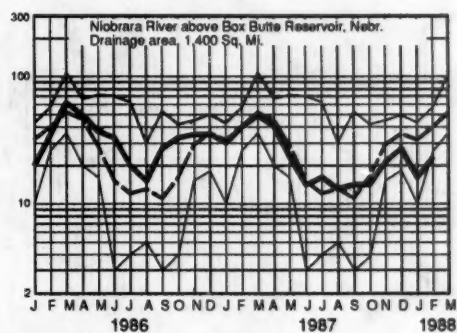
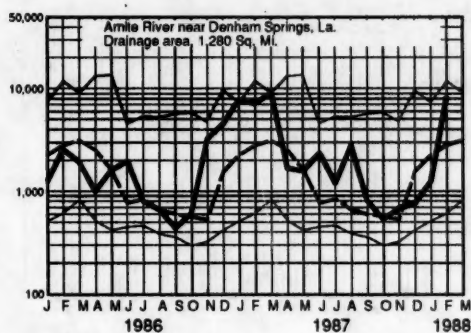
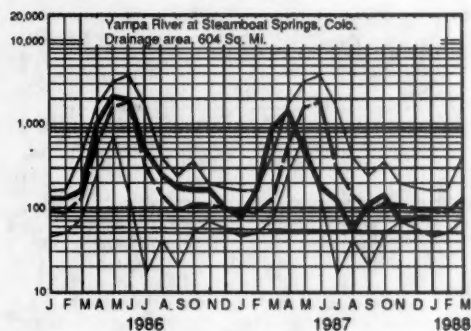
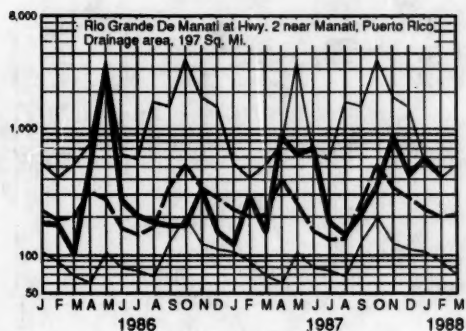
COMPARISON OF TOTAL MONTHLY MEANS WITH TOTAL MONTHLY MEDIANS (Cubic Feet per Second)



MONTHLY MEAN DISCHARGE OF SELECTED STREAMS

Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951-80. Heavy line indicates mean for current period.

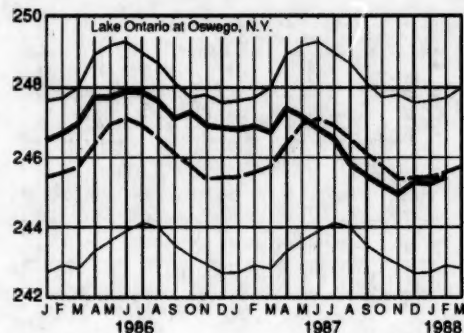
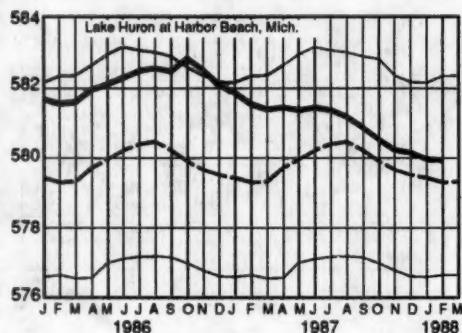
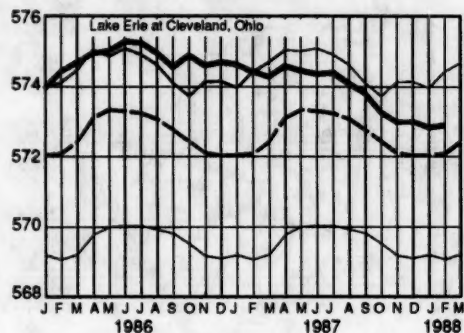
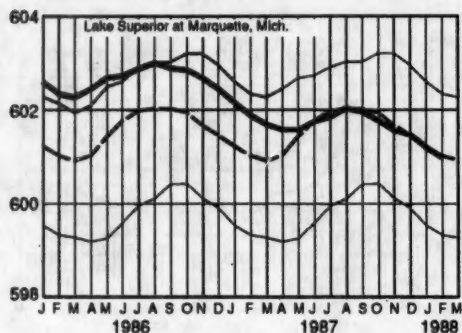
DISCHARGE, IN CUBIC FEET PER SECOND



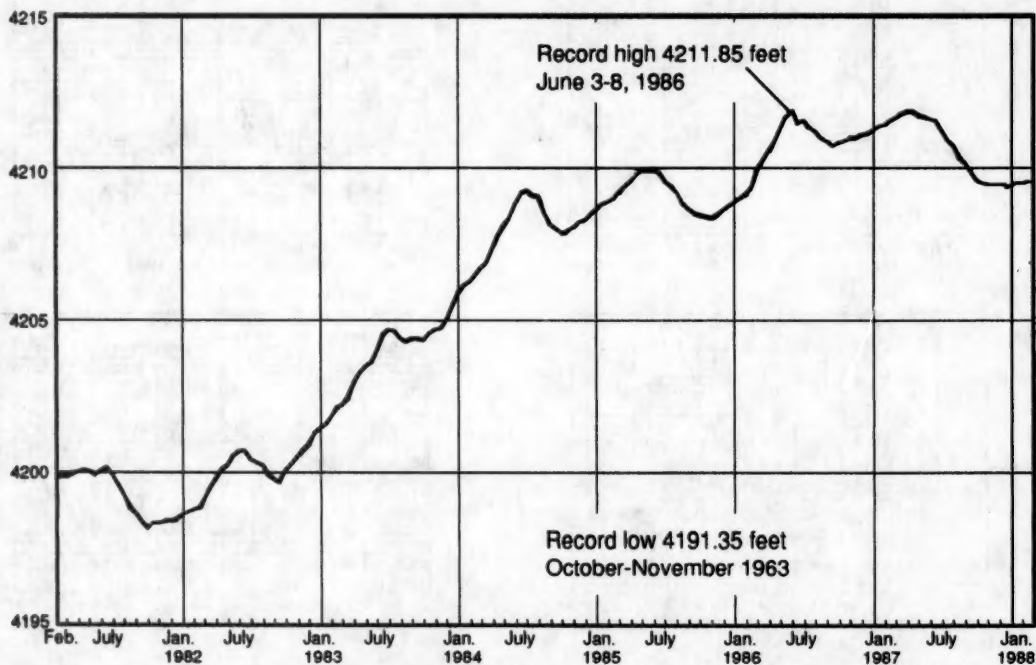
ELEVATION, IN FEET ABOVE NATIONAL GEODETIC VERTICAL DATUM OF 1929

GREAT LAKES ELEVATIONS

Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951-80. Heavy line indicates mean for current period. Data from National Ocean Service.



Fluctuations of Great Salt Lake, February 1981 through February 1988



(Continued from page 2.)

Only one February low and one February high occurred at streamflow index stations. Monthly mean flow was the highest of record for February on the Rio Grande De Manati at Highway 2, near Manati, Puerto Rico (drainage area 197 square miles), where the monthly mean flow of 422 cfs (112 percent above median) was the highest for February in 17 years of record. Monthly mean flow was the lowest of record for the month on the Niobrara River above Box Butte Reservoir, Nebraska (drainage area 1,400 square miles), where the monthly mean flow of 23.0 cfs (43 percent below median) was the lowest in 41 years of record. Hydrographs of streamflow at eight index stations, including those at which new February extremes occurred are on page 5. The hydrographs on the left are for stations at which flows are in the above-normal to normal range, while those on the right are for stations at which flows are in the below-normal range.

Mean February elevations at the four master gages on the Great Lakes (provisional National Ocean Service data) were in the normal range except on Lake Erie, which rose into the above-normal range. Levels rose from those for last month except on Lake Superior, which declined 0.21 foot, and was in the normal range for the 11th consecutive month. Lake Huron declined 0.02 foot, and was in the normal range for the seventh consecutive month. Lake Erie rose 0.05 foot, and was in the above-normal range again after a normal January which ended 43 consecutive months of levels in the above-normal range (June 1984 - December 1987). Lake Ontario rose 0.21 foot and was in the normal range for the fourth consecutive month. Levels ranged from 0.89 foot (Lake Superior) to 1.60 feet (Lake Huron) lower than those for February 1987. Stage hydrographs at the master gages for Lakes Superior, Huron, Erie, and Ontario are on page 6.

The level of Utah's Great Salt Lake (see graph on page 6) rose to 4,209.55 feet above National Geodetic Vertical Datum (NGVD) of 1929 on February 15, and was also at that elevation on February 29. The monthend level is 2.10 feet lower than that of February 28, 1987, but is still the third highest recorded for the end of February, below only those of February 1986 and February 1987.

The combined flow of the 3 largest rivers in the lower 48 States—Mississippi, St. Lawrence, and Columbia—averaged a normal 1,162,100 cfs (12 percent above median) during February, after a 4 percent decrease from January to February. This month's combined flow was the third highest for February in the last 6 years and 178,800 cfs (18 percent) higher than that for February 1987. Mean flow of the Mississippi River at Vicksburg, Mississippi, decreased by 8 percent from that for January, and was in the normal range after an above-normal January. Mean flow of the St. Lawrence River at Cornwall, Ontario, increased by 6 percent from that for January and was in the normal range for

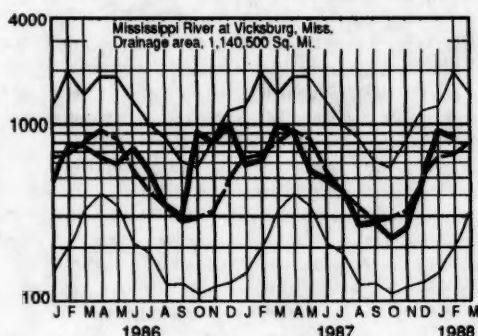
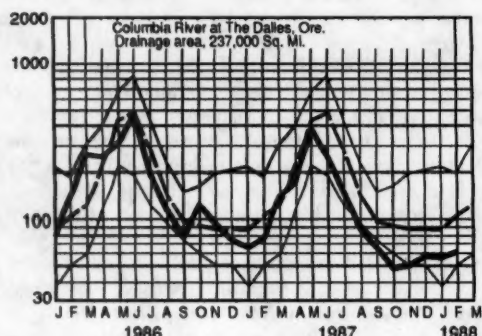
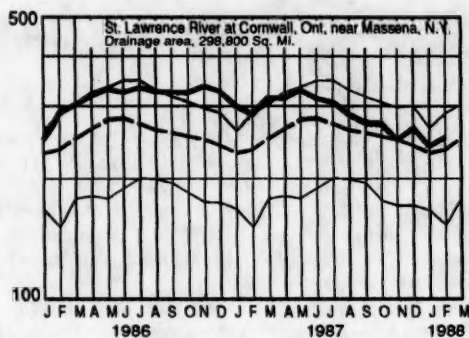
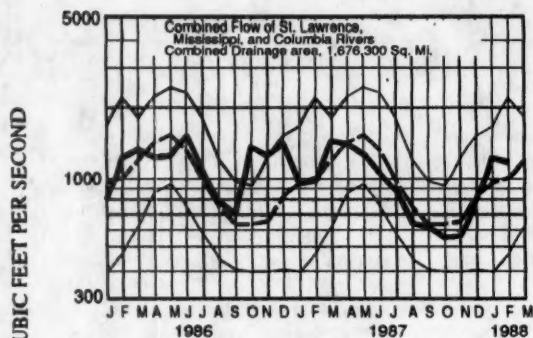
the second month. Mean flow of the Columbia River at The Dalles, Oregon, was in the below-normal range for the ninth consecutive month despite increasing by 9 percent from January to February. Flow hydrographs for both the combined and individual flows of the "Big 3" are shown on page 8. Dissolved solids and water temperatures at five large river stations are given on page 8. February flows of the "Big 3" and other large rivers are given in the Flow of Large Rivers table on page 9.

Contents of 74 percent of reporting reservoirs were near or above average for the end of February, about the same as for the end of January (75 percent). Most reporting reservoirs in Nova Scotia, Wisconsin, Oklahoma, Texas, Colorado, New Mexico, and Arizona had contents that were more than 5 percent of normal maximum contents above the average for the end of February. In contrast, most reporting reservoirs in Maine, North Carolina, North Dakota, Montana, Idaho, Washington, and California had contents that were more than 5 percent of normal maximum contents below the average for the end of February. Reservoirs or reservoir systems which had both a decline of more than 5 percent of normal maximum contents during the month and monthend contents more than 5 percent of normal maximum contents below monthend averages were: Gouin (Quebec), Maine's seven reservoir systems, High Rock Lake (North Carolina), Keystone (Oklahoma), Hungry Horse (Montana), Ross and Chelan (Washington), and also Lake Berryessa and Millerton Lake (California). Nova Scotia's reservoirs and New Jersey's Wanaque reservoir were the only sites that had both an increase of more than 5 percent of normal maximum contents during the month and monthend contents that were more than 5 percent of normal maximum contents above monthend averages. Graphs of contents for seven reservoirs are shown on page 10 with contents for the 99 reporting reservoirs given on page 11.

February precipitation (provisional National Weather Service data) was generally an inch or more below normal in Hawaii, coastal areas from Washington to northern California, southeastern Texas, southern Florida, and most of an area centered on western South Carolina and extending over parts of five States. Precipitation was generally an inch or more above normal in southern Alaska, along the Gulf Coast from extreme eastern Texas to the Florida panhandle, and at several sites scattered from southern Ohio to Rhode Island. There were no record-high February precipitation amounts. Record-low precipitation (amounts in inches) fell at Lewiston, Idaho (0.17); Duluth (0.13) and International Falls (0.14), Minnesota; Medford (0.20) and Salem (0.75), Oregon; Victoria, Texas (0.23); and Seattle-Tacoma (0.71) and Spokane (0.35), Washington. Total Precipitation and Percentage of Normal Precipitation maps for February are on page 14. March through May 1988 outlook maps for both temperature and precipitation are on page 15.

HYDROGRAPHS FOR THE "BIG THREE" RIVERS

Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates median of monthly values for reference period, 1951-80. Heavy line indicates mean for current period.



Provisional data; subject to revision

DISSOLVED SOLIDS AND WATER TEMPERATURES, FOR FEBRUARY 1988, AT DOWNSTREAM SITES ON FIVE LARGE RIVERS

Station number	Station name	February data of following calendar years	Stream discharge during month Mean (cfs)	Dissolved-solids concentration ^a		Dissolved-solids discharge ^a			Water temperature ^b		
				Minimum (mg/L)	Maximum (mg/L)	Mean (tons per day)	Minimum	Maximum	Mean in °C	Minimum in °C	Maximum in °C
01463500	Delaware River at Trenton, N.J. (Morrisville, Pa.)	1988	14,000	79	118	3,620	2,210	6,800	2.0	0.0	4.0
		1945-87	13,500	61	144	---	647	15,600	---	0.0	8.5
		(Extreme yr)	^c 12,240	(1954)	(1977)	(1976)	(1984)				
07289000	Mississippi River at Vicksburg, Miss.	1988	848,700	203	244	495,000	435,100	563,200	5.0	4.0	7.0
		1976-87	628,900	155	288	351,700	108,000	628,200	5.0	0.0	10.5
		(Extreme yr)	^c 672,800	(1982)	(1986)	(1977)	(1986)				
03612500	Ohio River at lock and dam 53, near Grand Chain, Ill. (stream-flow station at Metropolis, Ill.)	1988	391,000	185	263	---	109,000	301,000	---	3.0	4.5
		1955-87	433,000	98	308	---	44,900	419,000	---	0.0	10.0
		(Extreme yr)	^c 410,900	(1957)	(1967)	(1955)	(1974)				
06934500	Missouri River at Hermann, Mo. (60 miles west of St. Louis, Mo.)	1988	76,200	327	449	78,700	57,000	110,000	3.0	2.0	6.0
		1976-87	71,930	205	537	73,240	23,500	237,000	3.5	0.0	12.0
		(Extreme yr)	^c 49,190	(1985)	(1985)	(1977)	(1985)				
14128910	Columbia River at Warrendale, Ore. (streamflow station at The Dalles, Ore.)	1988	138,000	100	106	38,500	30,000	52,400	4.5	4.0	5.5
		1976-87	177,200	87	128	52,600	24,800	106,500	4.0	0.5	7.0
		(Extreme yr)	^c 104,800	(1976)	(1977, 1986)	(1977)	(1982)				

^aDissolved-solids concentrations, when not analyzed directly, are calculated on basis of measurements of specific conductance.

^bTo convert °C to °F: [(1.8 X °C) + 32] = °F.

^cMedian of monthly values for 30-year reference period, water years 1951-80, for comparison with data for current month.

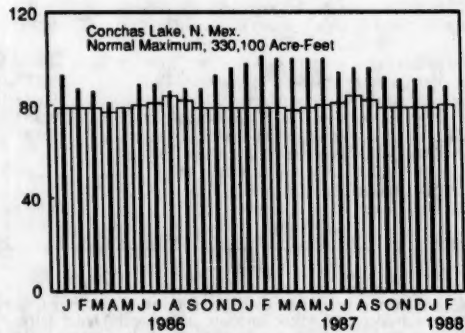
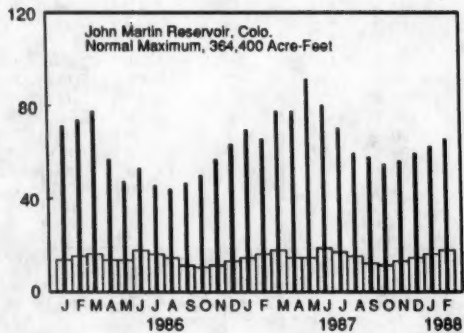
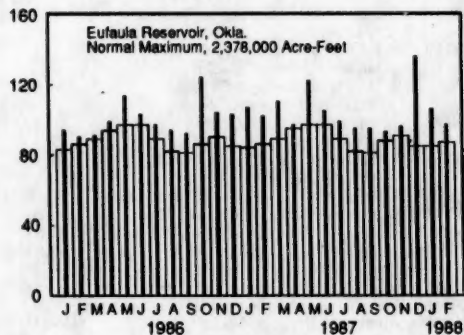
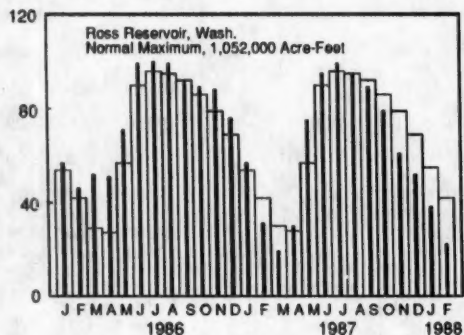
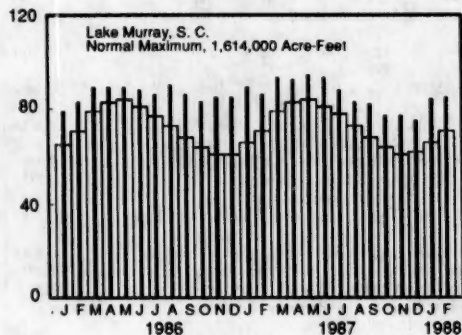
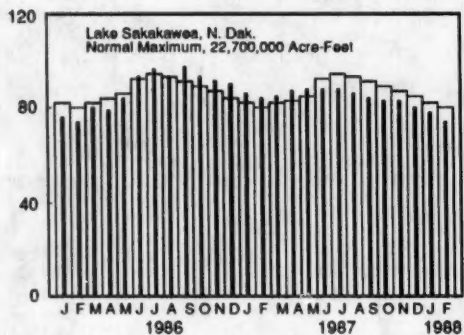
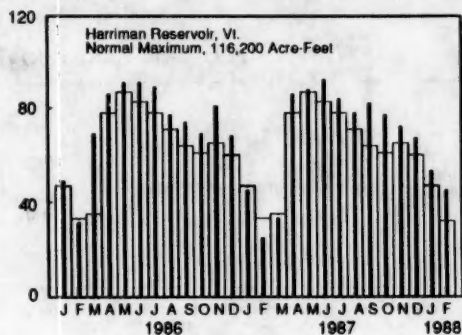
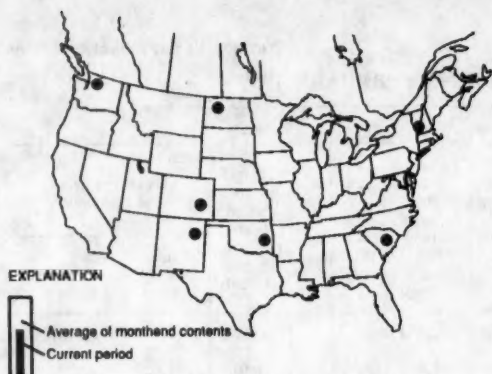
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FLOW OF LARGE RIVERS DURING FEBRUARY 1988

Station number	Stream and place of determination	Drainage area (square miles)	Average discharge through September 1980 (cubic feet per second)	February 1988					
				Monthly mean discharge (cubic feet per second)	Percent of median monthly discharge, 1951-80	Change in discharge from previous month (percent)	Discharge near end of month		
							Cubic feet per second	Million gallons per day	Date
01014000	St. John River below Fish River at Fort Kent, Maine	5,690	9,647	2,643	134	-19	2,350	1,518	29
01318500	Hudson River at Hadley, N.Y.	1,664	2,909	1,450	85	+10	1,020	659	29
01357500	Mohawk River at Cohoes, N.Y.	3,456	5,734	4,540	91	+76	3,000	1,900	29
01463500	Delaware River at Trenton, N.J.	6,780	11,750	14,000	114	+103	9,220	5,959	29
01570500	Susquehanna River at Harrisburg, Pa.	24,100	34,530	48,270	119	+55	23,600	15,250	28
01646500	Potomac River near Washington, D.C.	11,560	11,490	12,770	80	-9	8,540	5,519	29
02105500	Cape Fear River at William O. Huske Lock near Tarheel, N.C.	4,810	5,005	4,370	49	-26
02131000	Pee Dee River at Peedee, S.C.	8,830	9,851	9,517	63	-35	5,320	3,438	29
02226000	Altamaha River at Doctortown, Ga.	13,600	13,880	15,600	71	+107	21,300	13,770	25
02320500	Suwannee River at Branford, Fl.	7,880	6,987	4,250	53	+46	3,570	2,307	29
02358000	Apalachicola River at Chattahoochee, Fl.	17,200	22,570	23,700	74	+20	18,300	11,830	29
02467000	Tombigbee River at Demopolis lock and dam near Coatopa, Ala.	15,400	23,300	22,980	51	+14	6,600	4,270	29
02489500	Pearl River near Bogalusa, La.	6,630	9,768	14,540	85	+186	7,310	4,724	29
03049500	Allegheny River at Natrona, Pa.	11,410	19,480	30,800	120	+66	31,600	20,420	25
03085000	Monongahela River at Braddock, Pa.	7,337	12,510	20,500	111	+19	17,700	11,440	23
03193000	Kanawha River at Kanawha Falls, W.Va.	8,367	12,590	10,320	54	-21	7,660	4,950	25
03234500	Scioto River at Higby, Ohio	5,131	4,547	8,215	114	+518	3,330	2,152	29
03294500	Ohio River at Louisville, Ky. ²	91,170	11,600	193,900	111	+66	112,200	72,520	29
03377500	Wabash River at Mount Carmel, Ill.	28,635	27,220	61,050	164	+112	48,600	31,410	28
03469000	French Broad River below Douglas Dam, Tenn.	4,543	6,798	5,567	54	+14
04084500	Fox River at Rapide Croche Dam, near Wrightstown, Wis. ²	6,150	4,163	4,963	137	+10	4,290	2,772	29
04264331	St. Lawrence River at Cornwall, Ontario-near Massena, N.Y. ³	298,800	242,700	252,000	108	+6	263,000	170,000	29
02NG001	St. Maurice River at Grand Mere, Quebec	16,300	25,150	6,510	106	-14	19,700	12,730	29
05082500	Red River of the North at Grand Forks, N.Dak.	30,100	2,551	541	49	+20	620	400	29
05133500	Rainy River at Manitou Rapids, Minn.	19,400	11,830	6,000	64	-15	5,500	3,550	22
05330000	Minnesota River near Jordan, Minn.	16,200	3,402	488	97	-7	610	394	29
05331000	Mississippi River at St. Paul, Minn.	36,800	10,610	3,702	75	+9	3,500	2,260	29
05365500	Chippewa River at Chippewa Falls, Wis.	5,600	5,100	1,491	45	-25	1,500	970	29
05407000	Wisconsin River at Muscoda, Wis.	10,300	8,617	8,200	119	+23	6,800	4,390	29
05446500	Rock River near Joslin, Ill.	9,551	5,873	11,000	248	+28	11,200	7,240	29
05474500	Mississippi River at Keokuk, Iowa	119,000	62,620	55,500	134	+18	54,000	34,900	29
06214500	Yellowstone River at Billings, Mont.	11,796	7,038	2,040	75	-2	2,230	1,441	29
06934500	Missouri River at Hermann, Mo.	524,200	79,490	76,300	155	+12	80,000	52,000	29
07289000	Mississippi River at Vicksburg, Miss. ⁴	1,140,500	576,600	848,700	126	-8	726,000	469,200	29
07331000	Washita River near Dickson, Okla.	7,202	1,368	1,547	375	-52	2,600	1,680	29
08276500	Rio Grande below Taos Junction Bridge, near Taos, N.Mex.	9,730	725	603	125	+8	663	428	29
09315000	Green River at Green River, Utah	44,850	6,298	3,568	119	-9	3,710	2,400	29
11425500	Sacramento River at Verona, Calif.	21,257	18,820	11,180	29	-53	8,300	5,360	29
13269000	Snake River at Weiser, Idaho	69,200	18,050	11,300	58	+6	11,900	7,690	29
13317000	Salmon River at White Bird, Idaho	13,550	11,250	3,230	70	+6	3,470	2,242	29
13342500	Clearwater River at Spalding, Idaho	9,570	15,480	4,390	44	+33	4,800	3,100	29
14105700	Columbia River at The Dalles, Oreg. ⁵	237,000	193,100	161,400	59	+9	125,000	80,800	28
14191000	Willamette River at Salem, Oreg.	7,280	23,510	25,300	55	-49	11,300	7,300	28
15515500	Tanana River at Nenana, Alaska	25,600	23,460	6,475	101	-6	6,400	4,140	29
08MF005	Fraser River at Hope, British Columbia	83,800	96,290	22,530	66	+2	25,000	16,160	29

¹Adjusted.²Records furnished by Corps of Engineers.³Records furnished by Buffalo District, Corps of Engineers, through International St. Lawrence River Board of Control. Discharges shown are considered to be the same as discharge at Ogdensburg, N.Y. when adjusted for storage in Lake St. Lawrence.⁴Records of daily discharge computed jointly by Corps of Engineers and Geological Survey.⁵Discharge determined from information furnished by Bureau of Reclamation, Corps of Engineers, and Geological Survey.

USABLE CONTENTS OF SELECTED RESERVOIRS AND RESERVOIR SYSTEMS



PERCENT OF NORMAL MAXIMUM

USABLE CONTENTS OF SELECTED RESERVOIRS NEAR END OF FEBRUARY 1988

[Contents are expressed in percent of reservoir capacity. The usable storage capacity of each reservoir is shown in the column headed "Normal maximum."]

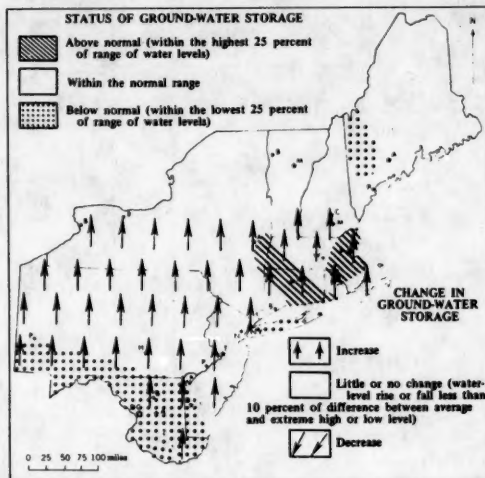
Principal uses: F-Flood control I-Irrigation M-Municipal P-Power R-Recreation W-Industrial	Percent of normal maximum				Normal maximum ^a (acre-feet)	Reservoir	Percent of Normal maximum				Normal maximum ^a (acre-feet)
	End of Feb. 1988	End of Feb. 1987	Average for end of Feb.	End of Jan. 1988			End of Feb. 1988	End of Feb. 1987	Average for end of Feb.	End of Jan. 1988	
NOVA SCOTIA											
Rossignol, Mulgrave, Falls Lake, St. Margaret's Bay, Black, and Ponhook Reservoirs(P).....	65	35	59	47	b226,300	NEBRASKA					
QUEBEC											
Allard (P).....	76	27	30	16	280,600	Lake McConaughy (IP).....					
Gouin (P).....	31	65	52	40	6,954,000	OKLAHOMA					
MAINE											
Seven reservoir systems (MP).....	33	29	40	43	4,107,000	Eufaula (FRP).....					
NEW HAMPSHIRE											
First Connecticut Lake (P).....	32	29	20	41	76,450	Keystone (FPR).....					
Lake Francis (FPR).....	39	26	31	50	99,310	Tenkiller Ferry (FPR).....					
Lake Winnepesaukee (PR).....	55	44	51	50	165,700	Lake Altus (FIMR).....					
VERMONT											
Harriman (P).....	45	25	32	53	116,200	Lake O'The Cherokees (FPR).....					
Somerset (P).....	54	45	51	61	57,390	OKLAHOMA-TEXAS					
MASSACHUSETTS											
Cobble Mountain and Borden Brook (MP).....	78	72	70	75	77,920	Lake Texoma (FMPRW).....					
NEW YORK											
Great Sacandaga Lake (FPR).....	35	29	36	45	786,700	TEXAS					
Indian Lake (FMR).....	52	57	42	53	103,300	Bridgeport (IMW).....					
New York City reservoir system (MW).....	87	83	83	85	1,680,000	Canyon (FMR).....					
NEW JERSEY											
Wanaque (M).....	87	90	80	78	85,100	International Amistad (FIMPW).....					
PENNSYLVANIA											
Allegheny (FPR).....	25	28	26	26	1,180,000	International Falcon (FIMPW).....					
Pymatuning (FMR).....	87	72	86	82	188,000	Livingston (IMW).....					
Raystown Lake (FR).....	68	68	56	67	761,900	Possom Kingdom (IMPRW).....					
Lake Wallenpaupack (PR).....	56	49	51	53	157,800	Red Bluff (PI).....					
MARYLAND											
Baltimore municipal system (M).....	90	74	88	87	261,900	Toledo Bend (P).....					
NORTH CAROLINA											
Bridgewater (Lake James) (P).....	84	90	84	87	288,800	Twin Buttes (FIM).....					
Narrows (Badin Lake) (P).....	92	100	100	90	128,900	Lake Kemp (IMW).....					
High Rock Lake (P).....	38	83	75	54	234,800	Lake Meredith (FWM).....					
SOUTH CAROLINA											
Lake Murray (P).....	85	86	71	84	1,614,000	Lake Travis (FIMPRW).....					
Lakes Marion and Moultrie (P).....	72	69	76	65	1,862,000	MONTANA					
SOUTH CAROLINA-GEORGIA											
Clark Hill (FP).....	43	75	68	38	1,730,000	Canyon Ferry (FIMPR).....					
GEORGIA											
Burton (PR).....	67	82	68	66	104,000	Fort Peck (FPR).....					
Sinclair (MPR).....	91	100	87	89	214,000	Hungry Horse (FIPR).....					
Lake Sidney Lanier (FMPR).....	45	52	57	44	1,686,000	WASHINGTON					
ALABAMA											
Lake Martin (P).....	74	82	76	74	1,375,000	Ross (PR).....					
TENNESSEE VALLEY											
Clinch Projects: Norris and Melton Hill Lakes (FPR).....	35	41	40	32	2,293,000	Franklin D. Roosevelt Lake (IP).....					
Douglas Lake (FPR).....	15	23	22	18	1,394,000	Lake Chelan (PR).....					
Hiwassee Projects: Chatuge, Nottely, Hiwassee, Apalachia, Blue Ridge, Ocoee 3, and Parksville Lakes (FPR).....	54	52	50	55	1,012,000	Lake Cushman (PR).....					
Holston Projects: South Holston, Watauga, Boone, Fort Patrick Henry, and Cherokee Lakes (FPR).....	42	46	42	38	2,880,000	Lake Merwin (P).....					
Little Tennessee Projects: Nantahala, Thorpe, Fontana, and Chilhowee Lakes (FPR).....	44	47	48	45	1,478,000	IDAHO					
WISCONSIN											
Chippewa and Flambeau (PR).....	81	59	27	84	365,000	Boise River (4 reservoirs) (FIP).....					
Wisconsin River (21 reservoirs) (PR).....	35	25	19	55	399,000	Coeur d'Alene Lake (P).....					
MINNESOTA											
Mississippi River headwater system (FMR).....	25	22	18	28	1,640,000	Pend Oreille Lake (FP).....					
NORTH DAKOTA											
Lake Sakakawea (Garrison) (FIPR).....	74	84	80	78	22,700,000	IDAHO-WYOMING					
SOUTH DAKOTA											
Angostura (I).....	70	94	74	69	130,768	Upper Snake River (8 reservoirs) (MP).....					
Belle Fourche (I).....	73	74	54	68	185,200	WYOMING					
Lake Francis Case (FIP).....	73	72	77	67	4,589,000	Boysen (FIP).....					
Lake Oahe (FIP).....	84	83	81	81	22,240,000	Buffalo Bill (IP).....					
Lake Sharpe (FIP).....	102	100	99	104	1,697,000	Keyhole (F).....					
Lewis and Clark Lake (FIP).....	87	78	90	98	432,000	Pathfinder, Seminole, Alcova, Kortez, Glendo, and Guernsey Reservoirs (I).....					
NEBRASKA											
Lake McConaughy (IP).....	79	82	75	77	1,948,000	COLORADO					
OKLAHOMA											
Eufaula (FRP).....	97	102	87	106	2,378,000	John Martin (FIR).....					
Keystone (FPR).....	82	109	93	105	661,000	Taylor Park (IR).....					
Tenkiller Ferry (FPR).....	103	106	91	110	628,200	Colorado-Big Thompson project (I).....					
Lake Altus (FIMR).....	101	101	51	100	133,000	COLORADO RIVER STORAGE PROJECT					
Lake O'The Cherokees (FPR).....	90	112	82	95	1,492,000	Lake Powell: Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR).....					
OKLAHOMA-TEXAS											
Lake Texoma (FMPRW).....	92	100	88	100	2,722,000	UTAH-IDAHO					
TEXAS											
Bridgeport (IMW).....	81	97	48	82	386,400	Bear Lake (IPR).....					
Canyon (FMR).....	95	99	80	92	385,600	CALIFORNIA					
International Amistad (FIMPW).....	101	84	83	101	3,497,000	Folsom (FIP).....					
International Falcon (FIMPW).....	107	79	72	104	2,668,000	Hetch Hetchy (MP).....					
Livingston (IMW).....	103	103	89	100	1,788,000	Isabella (FIR).....					
Possom Kingdom (IMPRW).....	66	97	95	66	570,200	Pine Flat (FI).....					
Red Bluff (PI).....	73	87	31	72	307,000	Clair Engle Lake (Lewiston) (P).....					
Toledo Bend (P).....	91	94	87	93	4,472,000	Lake Almanor (P).....					
Twin Buttes (FIM).....	84	55	32	82	177,800	Lake Berryessa (FIMW).....					
Lake Kemp (IMW).....	87	101	86	87	268,000	Millerton Lake (FI).....					
Lake Meredith (FWM).....	36	29	36	36	796,900	Shasta Lake (FIPR).....					
Lake Travis (FIMPRW).....	97	99	82	95	1,144,000	CALIFORNIA-NEVADA					
MONTANA											
Canyon Ferry (FIMPR).....	71	76	78	71	2,043,000	Lake Tahoe (IPR).....					
Fort Peck (FPR).....	78	84	81	79	18,910,500	NEVADA					
Hungry Horse (FIPR).....	41	67	64	55	3,451,000	Rye Patch (I).....					
WASHINGTON											
Ross (PR).....	22	31	42	38	1,052,000	ARIZONA-NEVADA					
Franklin D. Roosevelt Lake (IP).....	65	94	69	71	5,022,000	Lake Mead and Lake Mohave (FIMP).....					
Lake Chelan (PR).....	14	25	36	29	676,100	ARIZONA					
Lake Cushman (PR).....	55	55	83	50	359,500	San Carlos (IP).....					
Lake Merwin (P).....	101	99	96	101	245,600	Salt and Verde River system (IMPR).....					
IDAHO											
Boise River (4 reservoirs) (FIP).....	38	67	64	25	1,235,000	NEW MEXICO					
Coeur d'Alene Lake (P).....	21	32	53	12	238,500	Conchas (FIR).....					
Pend Oreille Lake (FP).....	29	35	53	33	1,561,000	Elephant Butte and Caballo (FIPR).....					
IDAHO-WYOMING											
Upper Snake River (8 reservoirs) (MP).....	59	66	71	51	4,401,000						
WYOMING											
Boysen (FIP).....	71	74	67	74	802,000						
Buffalo Bill (IP).....	47	65	62	46	421,300						
Keyhole (F).....	41	36	43	40	193,800						
Pathfinder, Seminole, Alcova, Kortez, Glendo, and Guernsey Reservoirs (I).....	60	71	52	59	3,056,000						
COLORADO											
John Martin (FIR).....	82	82	22	78	364,400						
Taylor Park (IR).....	71	71	56	71	106,200						
Colorado-Big Thompson project (I).....	69	69	57	69	730,300						
COLORADO RIVER STORAGE PROJECT											
Lake Powell: Flaming Gorge, Fontenelle, Navajo, and Blue Mesa Reservoirs (IFPR).....	84	83	...	86	31,620,000						
UTAH-IDAHO											
Bear Lake (IPR).....	73	74	59	71	1,421,000						
CALIFORNIA											
Folsom (FIP).....	44	54	59	39	1,000,000						
Hetch Hetchy (MP).....	39	34	30	43	360,400						
Isabella (FIR).....	24	43	31	26	568,100						
Pine Flat (FI).....	28	64	58	25	1,001,000						
Clair Engle Lake (Lewiston) (P).....	72	77	80	69	2,438,000						
Lake Almanor (P).....	71	77	53	68	1,036,000						
Lake Berryessa (FIMW).....	62	85	88	77	1,600,000						
Millerton Lake (FI).....	45	31	66	52	503,200						
Shasta Lake (FIPR).....	81	77	76	76	4,377,000						
CALIFORNIA-NEVADA											
Lake Tahoe (IPR).....	29	66	54	32	744,600						
NEVADA											
Rye Patch (I).....	32	75	63	31	194,300						
ARIZONA-NEVADA											
Lake Mead and Lake Mohave (FIMP).....	94	94	70	94	27,970,000						
ARIZONA											
San Carlos (IP).....	60	80	29	58	935,100						
Salt and Verde River system (IMPR).....	90	86	48	84	2,019,100						
NEW MEXICO											
Conchas (FIR).....	88	101	80	88	330,100						
Elephant Butte and Caballo (FIPR).....	97	96	37	95	2,442,000						

GROUND-WATER CONDITIONS DURING FEBRUARY 1988

Ground-water levels rose seasonally in most of the central and western parts of the Northeast. (See map.) Elsewhere in the region, levels generally remained about the same or declined slightly. Levels rose slightly on Long Island, New York, but remained below average. Levels near the end of the month were below average also in eastern Maine and in most of Maryland and Delaware. Levels were above average in parts of central and southern New England. Levels were the highest for February in two key observation wells: one in northeastern Massachusetts (52 years of record); and one in northeastern Rhode Island (42 years of record).

In the Southeastern States, ground-water levels rose in Louisiana and Mississippi. Net changes in levels were mixed in Kentucky, West Virginia, Virginia, North Carolina, and Georgia. Water levels were above long-term averages in Kentucky and North Carolina, and below average in Arkansas and Louisiana. Levels were mixed with respect to average in West Virginia and Virginia. New low levels for February occurred in the key well in Memphis, Tennessee, and in the Cockspur Island well in the Savannah area of Georgia. A new February low occurred also in the Stuttgart well in Arkansas, despite a net rise of nearly 6 feet during the month.

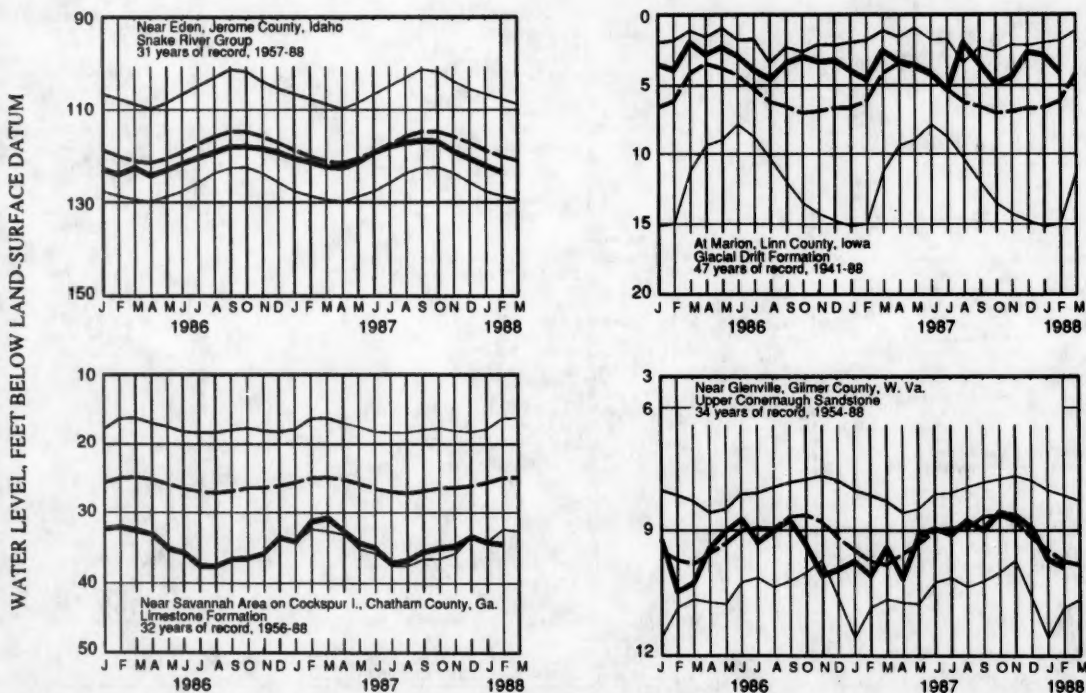
In the central and western Great Lakes States, ground-water levels rose in Indiana and Ohio, declined in Minnesota, and changed variably in Michigan and Iowa.



Map showing ground-water storage near end of February and change in ground-water storage from end of January to end of February.

MONTH-END GROUND-WATER LEVELS IN KEY WELLS

Area between light-weight solid lines indicates range between highest and lowest record for the month. Dashed line indicates average of monthly levels in previous years. Heavy line indicates level for current period.



Levels were in the normal range in Indiana, and normal and below average in Ohio. Levels were mixed with respect to average in Michigan and Iowa, and below average in Minnesota. A new high level for February occurred in the key well at Princeton, Illinois, despite a net decline of more than a foot during the month.

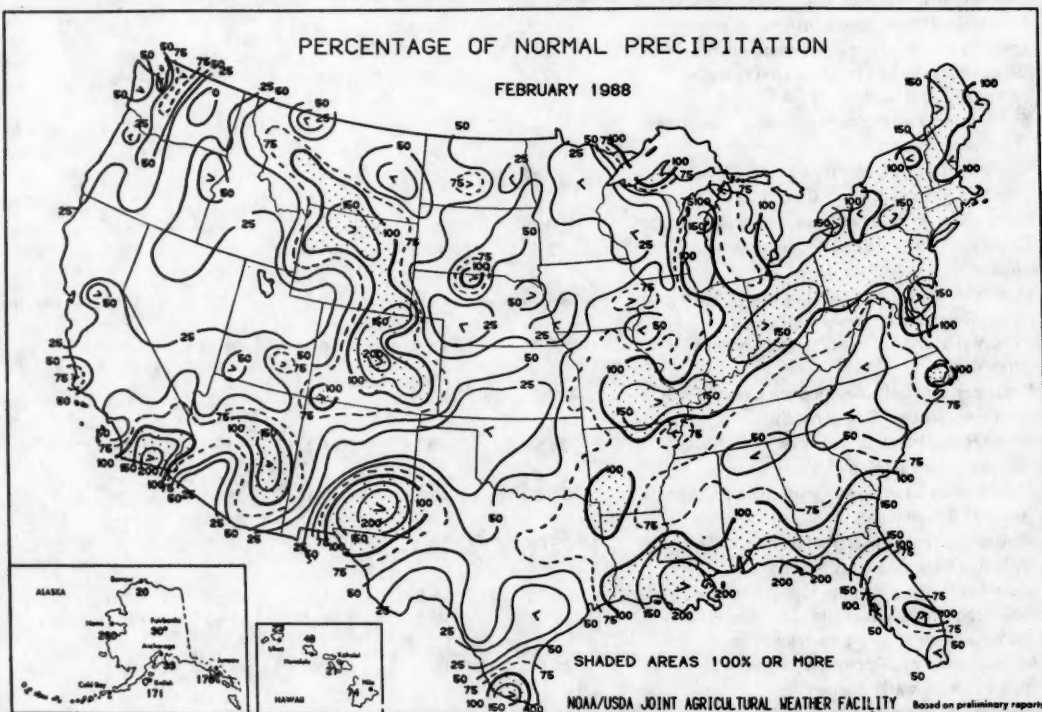
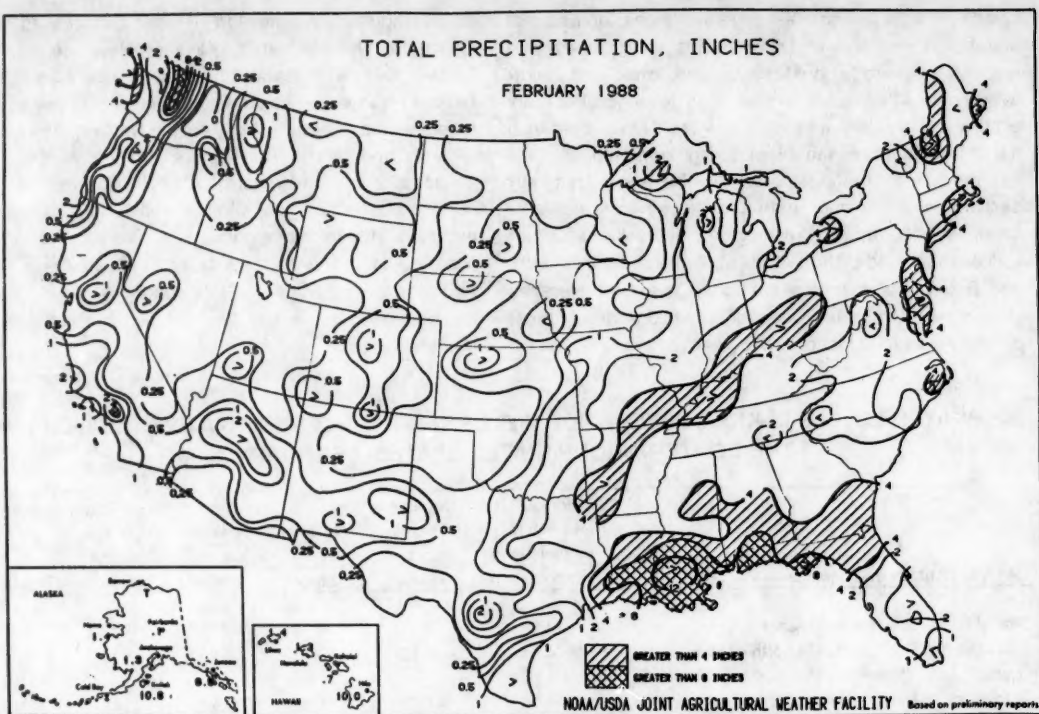
In the Western States, ground-water levels generally declined in Idaho and North Dakota. Mixed water-level changes occurred in Washington, Nebraska, southern California, Nevada, Utah, Kansas, Arizona, New Mexico, and Texas. Water levels were above long-term averages in Nebraska, and below average in Arizona and in most of the key wells in Idaho. Levels were mixed with respect

to average in Washington, North Dakota, southern California, Nevada, Utah, Kansas, New Mexico, and Texas. A new February high level occurred in the Dunning well in Nebraska. New all-time high levels were reached in the Steptoe Valley well in Nevada (38 years of record), and in the Berrendo-Smith key well in New Mexico (22 years of record). A new February low level occurred in the Las Vegas Valley well in Nevada. Despite net rises during the month, new February lows also occurred in the Holladay well in Utah, in the Kansas Agricultural Experiment Station key well in Colby, Kansas, and in the key well in the El Paso area in western Texas.

Provisional data; subject to revision

WATER LEVELS IN KEY OBSERVATION WELLS IN SOME REPRESENTATIVE AQUIFERS IN THE CONTERMINOUS UNITED STATES--FEBRUARY 1988

Aquifer and Location	Water level in feet with reference to land-surface datum	Departure from average in feet	Net change in water level in feet since:		Year records began	Remarks
			Last month	Last year		
Glacial drift at Hanska, south-central Minnesota.....	-14.05	-5.17	-0.93	-7.23	1942	
Glacial drift at Roscommon in north-central part of Lower Peninsula, Michigan.	-4.84	+0.12	+0.17	-0.03	1935	
Glacial drift at Marion, Iowa.....	-4.08	+1.71	-1.25	+0.52	1941	
Glacial drift at Princeton in northwestern Illinois.....	-5.85	+6.46	-1.15	+2.5	1943	Feb. high.
Petersburg Granite, southeastern Piedmont near Fall Zone, Colonial Heights, Virginia.	-15.32	-0.56	+1.48	-2.63	1939	
Glacial outwash sand and gravel, Louisville, Kentucky (U.S. well no. 2).	-19.62	+5.54	-0.33	-0.99	1946	
500-foot sand aquifer near Memphis, Tennessee (U.S. well no. 2).	-106.04	-16.49	-0.48	-0.60	1941	Feb. low.
Weathered granite, Mocksville area, Davie County, western Piedmont, North Carolina.	-17.60	+1.92	0.0	-0.09	1932	
Sparta Sand in Pine Bluff industrial area, Arkansas...	-234.10	-25.97	-2.60	-3.65	1958	
Eutaw Formation in the City of Montgomery, Alabama (U.S. well no. 4).	-25.4	+3.3	+3.3	-2.6	1952	
Limestone aquifer on Cocksbur Island, Savannah area, Georgia (U.S. well no. 6).	-34.53	-8.66	-0.21	-3.25	1956	Feb. low.
Sand and gravel in Puget Trough, Tacoma, Washington.	-102.86	+4.94	+0.33	-2.20	1952	
Pleistocene glacial outwash gravel, North Pole, northern Idaho (U.S. well no. 3).	-467.7	-5.8	-0.9	-2.6	1929	
Snake River Group: Snake River Plain Aquifer, at Eden, Idaho (U.S. well no. 4).	-123.5	-3.1	-1.4	-2.1	1957	
Alluvial valley fill in Flowell area, Millard County, Utah (U.S. well no. 9).	-15.62	+8.18	+0.48	-8.90	1929	
Alluvial sand and gravel, Platte River Valley, Ashland, Nebraska (U.S. well no. 6).	-5.08	+0.18	-0.23	-1.33	1935	
Alluvial valley fill in Steptoe Valley, Nevada.....	-6.55	+5.83	+0.25	+0.34	1950	All-time high.
Pleistocene terrace deposits in Kansas River valley, at Lawrence, northeastern Kansas.	-20.34	+0.74	-0.13	-2.82	1953	
Alluvium and Paso Robles clay, sand, and gravel, Santa Maria, California.	-129.25	+14.05	-2.67	+3.05	1957	
Valley fill, Elfrida area, Douglas, Arizona (U.S. well no. 15).	-102.2	-21.9	+0.1	+0.4	1951	
Hueco bolson, El Paso area, Texas.....	-266.42	-19.20	+0.47	-1.63	1965	Feb. low.
Evangelina aquifer, Houston area, Texas.....	-296.50	+1.03	+4.26	+16.16	1965	



(From *Weekly Weather and Crop Bulletin* prepared and published by the NOAA/USDA Joint Agricultural Weather Facility)

TEMPERATURE OUTLOOK FOR MARCH THROUGH MAY 1988



PRECIPITATION OUTLOOK FOR MARCH THROUGH MAY 1988



NATIONAL WATER CONDITIONS

FEBRUARY 1988

Based on reports from the Canadian and U.S. Field offices; completed March 21, 1988

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EXPLANATION OF DATA (Revised January 1988)

Cover map shows generalized pattern of streamflow for the month based on provisional data from 183 index gaging stations--18 in Canada, 163 in the United States, and 2 in the Commonwealth of Puerto Rico. Alaska, Hawaii, and Puerto Rico inset maps show streamflow only at the index gaging stations that are located near the point shown by the arrows. Classifications on map are based on comparison of streamflow for the current month at each index station with the flow for the same month in the 30-year reference period, 1951-80. Shorter reference periods are used for one Canadian index station, two Kansas index stations, one New York index station, and the Puerto Rico index stations because of the limited records available.

The persistence/change map shows where streamflow has persisted in the above- or below-normal range from last month to this month and also where streamflow is in the above- or below-normal range this month after being in a different range last month. The pie charts show percent of stations reporting discharges in each flow range for the conterminous United States, southern Canada, the two areas combined, and also the percent of area in each flow range for the conterminous United States and southern Canada. The bar graph shows total mean and total median flow for all reporting stations in the conterminous United States and southern Canada.

The comparative data are obtained by ranking the 30 flows for each month of the reference period in order of decreasing magnitude--the

highest flow is given a ranking of 1 and the lowest flow is given a ranking of 30. Quartiles (25-percent points) are computed by averaging the 7th and 8th highest flows (upper quartile), 15th and 16th highest flows (middle quartile and median), and the 23rd and 24th highest flows (lower quartile). The upper and lower quartiles set off the highest 25 percent of flows and lowest 25 percent of flows, respectively, for the reference period. The median (middle quartile) is the middle value by definition. For the reference period, 50 percent of the flows are greater than the median, 50 percent are less than the median, 50 percent are between the upper and lower quartiles (in the normal range), 25 percent are greater than the upper quartile (above normal), and 25 percent are less than the lower quartile (below normal). Flow for the current month is then classified as: *above normal* if it is greater than the upper quartile, *in the normal range* if it is between the upper and lower quartiles, and *below normal* if it is less than the lower quartile. Change in flow from the previous month to the current month is classified as *seasonal* if the change is in the same direction as the change in the median. If the change is in the opposite direction of the change in the median, the change is classified as *contraseasonal* (opposite to the seasonal change). For example: at a particular index station, the January median is greater than the December median; if flow for the current January increased from December (the previous month), the increase is seasonal; if flow for the current January decreased from December, the decrease is contraseasonal.

Flood frequency analyses define the relation of flood peak magnitude to probability of occurrence or recurrence interval. Probability of occurrence is the chance that a given flood magnitude will be exceeded in any one year. Recurrence interval is the reciprocal of probability of occurrence and is the average number of years between occurrences. For example, a flood having a probability of occurrence of 0.01 (1 percent) has a recurrence interval of 100 years. Recurrence intervals imply no regularity of occurrence; a 100-year flood might be exceeded in consecutive years or it might not be exceeded in a 100-year period.

Statements about ground-water levels refer to conditions near the end of the month. The water level in each key observation well is compared with average level for the end of the month determined from the 30-year reference period, 1951-80, or from the entire past record for that well when only limited records are available. Comparative data for ground-water levels are obtained in the same manner as comparative data for streamflow. Changes in ground-water levels, unless described otherwise, are from the end of the previous month to the end of the current month.

Dissolved solids and temperature data for February are given for five stream-sampling sites that are part of the National Stream Quality Accounting Network (NASQAN). Dissolved solids are minerals dissolved in water and usually consist predominantly of silica and ions of calcium, magnesium, sodium, potassium, carbonate, bicarbonate, sulfate, chloride, and nitrate. Dissolved-solids discharge represents the total daily amount of dissolved minerals carried by the stream. Dissolved-solids concentrations are generally higher during periods of low streamflow, but the highest dissolved-solids discharges occur during periods of high streamflow because the total quantities of water, and therefore total load of dissolved minerals, are so much greater than at times of low flow.

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